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(REV 11-2000)

US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 USC § 371

US APPLICATION NO (If known, see 37 CFR 1.5

09/914473

INTERNATIONAL APPLICATION NO
PCT/GB00/00621INTERNATIONAL FILING DATE
February 22, 2000PRIORITY DATE CLAIMED
March 3, 1999TITLE OF INVENTION
CLOSURE SEALING WAD

APPLICANT(S) FOR DO/EO/US

Andrew Ferry; Peter Douglas KERR and David SENIOR

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

- 1 ☒ This is a **FIRST** submission of items concerning a filing under 35 USC § 371 ☐
- 2 ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC § 371 ☐
- 3 ☒ This is an express request to begin national examination procedures (35 USC § 371(f)) ☐ The submission must include items (5), (6), (9) and (21) indicated below ☐
- 4 ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31) ☐
- 5 ☒ A copy of the International Application as filed (35 USC § 371(c)(2))
 - a ☐ is attached hereto (required only if not communicated by the International Bureau) ☐
 - b ☒ has been communicated by the International Bureau ☐
 - c ☐ is not required, as the application was filed in the United States Receiving Office (RO/US) ☐
- 6 ☒ An English language translation of the International Application as filed (35 USC § 371(c)(2)) ☐
 - a ☐ is attached hereto ☐
 - b ☒ has been previously submitted under 35 USC § 54(d)(4) ☐
- 7 ☒ Amendments to the claims of the International Application under PCT Article 19 (35 USC § 371(c)(3))
 - a ☐ are attached hereto (required only if not communicated by the International Bureau) ☐
 - b ☐ have been communicated by the International Bureau ☐
 - c ☐ have not been made; however, the time limit for making such amendments has NOT expired ☐
 - d ☐ have not been made and will not be made ☐
- 8 ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 USC § 371 (c)(3)) ☐
- 9 ☒ An oath or declaration of the inventor(s) (35 USC § 371(c)(4)) ☐
- 10 ☒ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 USC § 371(c)(5)) ☐

Items 11 to 20 below concern document(s) or information included:

- 11 ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98 ☐
- 12 ☒ An assignment document for recording ☐ A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included ☐
- 13 ☒ A **FIRST** preliminary amendment ☐
- 14 ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment ☐
- 15 ☐ A substitute specification ☐
- 16 ☐ A change of power of attorney and/or address letter ☐
- 17 ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter2 and 35 USC § 821 - 1.825 ☐
- 18 ☐ A second copy of the published international application under 35 USC § 54(d)(4) ☐
- 19 ☐ A second copy of the English language translation of the international application under 35 USC § 54(d)(4) ☐
- 20 ☐ Other items or information:

US APPLICATION NO. (if known, see 37 CFR 1.53) 09/914473		INTERNATIONAL APPLICATION NO. pct/gb00/00621		ATTORNEY'S DOCKET NUMBER	
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21 <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1000.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$710.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00 ENTER APPROPRIATE BASIC FEE AMOUNT =				CALCULATIONS PTO USE ONLY	
				\$ 1000.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)) <input type="checkbox"/>				\$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$	
Total claims	10 - 20 =	0	x \$18.00	\$ 0	
Independent claims	2 - 3 =	0	x \$80.00	\$ 0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable) "AMENDED"				+ \$270.00	
TOTAL OF ABOVE CALCULATIONS =				\$ 1000.00	
<input type="checkbox"/> Applicant claims small entity status <input type="checkbox"/> See 37 CFR 1.27 <input type="checkbox"/> The fees indicated above are reduced by 1/2 <input type="checkbox"/>				\$	
SUBTOTAL =				\$ 1000.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)) <input type="checkbox"/>				\$	
TOTAL NATIONAL FEE =				\$ 1000.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)) <input type="checkbox"/> The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) <input type="checkbox"/> \$40.00 per property +				\$ 40.00	
TOTAL FEES ENCLOSED =				\$ 1040.00	
				Amount to be refunded:	\$
				charged:	\$

a ☒ A check in the amount of \$ 1040.00 to cover the above fees is enclosed ☐

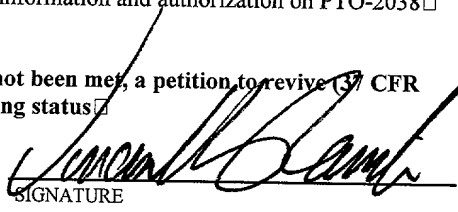
b ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees ☐
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d ☐ Fees are to be charged to a credit card ☐ **WARNING:** Information on this form may become public ☐ Credit card
 information should not be included on this form ☐ Provide credit card information and authorization on PTO-2038 ☐

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR
 1.437 (a) or (b)) must be filed and granted to restore the application to pending status ☐

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PCT Patent Application of:

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PCT/GB00/00621

International Filing Date: February 22, 2000
Filed in DO/US: **August 29, 2001**

CLOSURE SEALING WAD

August 29, 2001

Box PCT
Assistant Commissioner of Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Contemporaneously with the filing of the above-captioned PCT designated office patent application and prior to examination on the merits thereof, please amend the application as follows:

IN THE SPECIFICATION:

Page 1 ("AMENDED SHEET") before line 1, insert the following heading:

-- TITLE OF THE INVENTION --;

and

Page 1 ("AMENDED SHEET"), between lines 1 and 2, insert the following heading:

-- BACKGROUND OF THE INVENTION -- .

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Page 2 (“AMENDED SHEET”), between lines 22 and 23, insert the following heading:

-- SUMMARY OF THE INVENTION --.

Page 7 (“SUBSTITUTE SHEET (RULE 26)”), between lines 3 and 4, insert the following heading:

-- BRIEF DESCRIPTION OF THE DRAWINGS --;

and

Page 7 (“SUBSTITUTE SHEET (RULE 26)”), between lines 22 and 23, insert the following heading:

-- DESCRIPTION OF THE PREFERRED EMBODIMENTS --.

Page 15 (“SUBSTITUTE SHEET (RULE 26)”), after the last line, please insert the following new paragraph:

- - Although a preferred embodiment of the invention has been specifically illustrated and described herein, it is to be understood that minor variations may be made in the apparatus without departing from the spirit and scope of the invention, as defined the appended claims. - -

IN THE CLAIMS (AMENDED SHEET):

Before claim 1, insert the following new paragraph:

- - What is claimed is: - -

Claims 3 (“AMENDED SHEET”), kindly amend as follows:

3. (Amended) A closure according to claim 1, wherein the sealing flange further comprises a spacer (42), arranged between the opposed surfaces of the sealing flange (31) and the closure, the spacer (42) arranged to prevent the upstanding rim (40) from folding completely flat.

Claim 5 (“AMENDED SHEET”), please rewrite as follows:

5. (Amended) A closure according to claim 1, wherein the upstanding rim (40) is arranged substantially parallel to the central axis of the closure and the sealing flange (31) is arranged at an acute angle to the upstanding rim (40), so that the sealing flange (31) cams the upstanding rim (40) inwardly as it contacts the neck (1) of the container.

Please add the following new claims:

7. (New) A closure according to claim 2, wherein the sealing flange further comprises a spacer (42), arranged between the opposed surfaces of the sealing flange (31) and the closure, the spacer (42) arranged to prevent the upstanding rim (40) from folding completely flat
8. (New) A closure according to claim 2, wherein the upstanding rim (40) is arranged substantially parallel to the central axis of the closure and the sealing flange (31) is arranged at an acute angle to the upstanding rim (40), so that the sealing flange (31) cams the upstanding rim (40) inwardly as it contacts the neck (1) of the container.

9. (New) A closure according to claim 3, wherein the upstanding rim (40) is arranged substantially parallel to the central axis of the closure and the sealing flange (31) is arranged at an acute angle to the upstanding rim (40), so that the sealing flange (31) cams the upstanding rim (40) inwardly as it contacts the neck (1) of the container.
10. (New) A closure according to claim 5, wherein the upstanding rim (40) is arranged substantially parallel to the central axis of the closure and the sealing flange (31) is arranged at an acute angle to the upstanding rim (40), so that the sealing flange (31) cams the upstanding rim (40) inwardly as it contacts the neck (1) of the container.

REMARKS

Commensurate with the filing of this application, the Examiner is respectfully requested to introduce this amendment in order that the proper headings are inserted, all multiple dependent claims cancelled and both the government filing fee and examination are based upon the claims of record after the introduction of the present amendment.

The claims of record for prosecution of the United States national phase are claims 1 through 6. The present amendment herewith cancels the multiple dependent claims and adds new claims 7 through 10 to cover the cancelled subject matter by way of the dependency thereof from claims 3 and 5.

Upon entry of this amendment, favorable consideration on the merits of the claims is respectfully solicited.

Respectfully submitted,

DILLER, RAMIK & WIGHT

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Attachment: Marked-up Claims

MARKED-UP CLAIMS

Claim 3, amended as follows:

3. (Amended) A closure according to claim 1 [or claim 2], wherein the sealing flange further comprises a spacer (42), arranged between the opposed surfaces of the sealing flange (31) and the closure, the spacer (42) arranged to prevent the upstanding rim (40) from folding completely flat.

Claim 5, amended as follows:

5. (Amended) A closure according to [any one of the preceding claims] claim 1, wherein the upstanding rim (40) is arranged substantially parallel to the central axis of the closure and the sealing flange (31) is arranged at an acute angle to the upstanding rim (40), so that the sealing flange (31) cams the upstanding rim (40) inwardly as it contacts the neck (1) of the container.

Rec'd PCT/PTO 29 AUG 2001

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CLOSURE SEALING WAD

This invention relates to an improved sealing wad or liner for use in closure caps. The invention is particularly suitable for use with ROPP (Roll-On Pilfer Proof) closures and in conjunction with pourers or non-refilling devices fitted inside the bore of a container neck.

A sealing wad or liner is often used in association with known closures. Generally, such closures have a planar crown, to cover the container mouth, and a tubular skirt which depends from the periphery of the crown and is adapted to locate on the outside of the container by, for example, threaded engagement. A sealing wad or liner is received adjacent to the closure crown to provide a seal around the mouth of the container.

For example, FR1378262 describes a plastic disc for use in conjunction with a metal crown. The plastic disc has a projecting annular wall of approximately the same diameter as the internal diameter of a bottle neck and a peripheral lip perpendicular to the disc. As the metal crown is applied to the bottle the lip deforms and seals around the outside of the bottle neck and the annular wall seals against the inside.

In an ROPP closure, a capsule made of thin metal is removably attached to the container. The capsule is fitted in position on the container neck and thread formations are rolled into the capsule skirt, conforming automatically to the underlying threads on the container neck to provided the necessary threaded engagement between the two. At the same time as the thread is formed, the free edge of the skirt is usually rolled

AMENDED SHEET

inwardly under an annular shoulder on the container.
This, in combination with a line of weakening provided
around the periphery of the skirt, forms a tamper evident
or security band. When the closure is unscrewed for the
5 first time, this band separates from the remainder of the
closure along the line of weakening, thereby providing
visual evidence that an attempt has been made to open the
container.

A waxed, cardboard sealing wad is usually provided
10 in conventional ROPP closures. The sealing wad is
retained in the capsule by means of an annular retaining
bead formed around the periphery of the closure skirt,
adjacent to the crown. When the container is capped, the
mouth of the container locally deforms the cardboard
15 sealing wad, to provide a seal. However, cardboard
sealing wads are not always suitable, particularly when
the container is provided with a device that is designed
to be substantially or wholly received in the neck of the
container; hereinafter referred to as "in-bore" devices.
20 Such devices include, for example, pourers and non-
refilling devices for insertion in containers of fine
spirits.

Accordingly the present invention provides a closure
comprising a closure shell and a liner adapted to seal
25 the mouth of a container, the liner having a sealing
flange, arranged to overlies the container mouth,
the sealing flange having an upstanding rim around its
periphery, characterised in that on application of the
closure on the container the upstanding rim folds towards
30 the sealing flange, without folding completely flat,
thereby constituting a biasing means for biasing the

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periphery of the sealing flange against the outside edge of the container mouth.

In particular, the invention provides a means of improving the seal between a closure and a container
5 fitted with an in-bore device, such as a non-refilling device.

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Various proposals for in-bore, non-refilling devices are described in Patent Publications US 4258854, GB 2026428, WO 96/04179 and WO 98/42587. In US 4258854, WO 96/04179 and WO 98/42587, the housing of the non-
5 refilling device is provided with an annular flange which is arranged to overlie the rim of the container. The annular flange acts as a closure liner and provides a seal when the closure is fully tightened onto the container. The annular flange is adapted to releasably
10 engage with the main body of the non-refilling device. Thus, the in-bore device can be assembled inside the closure cap prior to delivery to the bottling line. The combined closure and in-bore device can then be applied to the container neck as a single unit, reducing the time
15 required to cap the bottles.

A disadvantage of this arrangement is that it is difficult to obtain as good a seal as can be achieved using the conventional cardboard wad. This causes particular problems when the filled bottles are being
20 transported or stored in adverse conditions, such as hot and humid conditions. However, use of a conventional cardboard wad in conjunction with a non-refilling device is considered unacceptable as the closure has to be applied to the bottle independently of the in-bore device
25 which increases process times and costs.

Therefore, the present invention also aims to provide an in-bore device, such as a non-refilling device, having the advantages of the existing in-bore devices but with improved sealing performance. The device
30 must be capable integration with the closure or capsule

for delivery to the filling line, relatively cheap and easy to mould and easy to assemble, but should seal the container opening as well as a closure containing a conventional cardboard wad.

- 5 Accordingly, the present invention also provides an in-bore device for a container having a body portion, at least part of which is adapted to be held firmly in the neck of a container, and a liner portion, arranged to be held captive in a closure and to co-operate releasably
- 10 with the body portion, the liner portion having a sealing flange, arranged to overlie the container mouth, the sealing flange having an upstanding rim around its periphery, characterised in that on application of the closure and in-bore device to the container the
- 15 upstanding rim folds towards the sealing flange, without folding completely flat, thereby constituting a biasing means for biasing the periphery of the sealing flange against the outside edge of the container mouth.

- 20 The liner according to the invention is preferably made of a plastics material. When used in conjunction with an in-bore device, the liner is provided with means for releasable engagement with the body portion of the in-bore device. This releasable connection may be provided, for example, by a snap fit arrangement or by
- 25 frangible bridges, which break on first opening of the container. The in-bore device and liner may be inserted into the closure cap and the resultant integrated unit provided to the bottling line for insertion into the neck of a container.

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The upstanding rim is located around the periphery of the liner, between the opposed surfaces of the liner and the crown of the closure. As the closure is applied to the container, the force applied to the closure crown by the capping head folds the upstanding rim towards the sealing flange, which in turn forces the periphery of the liner around the outside edge of the mouth of the container, thereby providing a seal. The upstanding rim may be segmented or shaped to provide the required sealing force. Where the closure crown is made from a thin, deformable material, such as in an ROPP closure, the upstanding rim is preferably continuous, to reduce the risk of producing a witness mark on the crown of the closure during the capping process.

15 The upstanding rim around the periphery of the liner is configured to have a spring characteristic when it is folded. As the closure is applied to the container, the spring bias in the folded structure provides the biasing force required to force the periphery of the liner around the outside edge of the rim of the container. The biasing effect of the liner is not reliant on the inherent resilience of the liner material. Thus, the invention is particularly advantageous where the liner is made from a relatively rigid material due to the need to provide engagement means, so that the liner can be releasably connected to an in-bore device, for example.

20 On application of the closure to the container, the upstanding rim is folded towards the sealing flange by the force exerted on the crown of the closure by the capping head. In its folded configuration, the rim acts

like a folded spring and biases the periphery of the liner around the outside edge of the container mouth. In order to ensure that the folded rim acts like a folded spring rather than a local material thickening, it is
5 important that the rim is not folded completely flat against the sealing flange.

Preferably, a spacer is provided between the opposed surfaces of the crown of the closure and the liner. The spacer may take the form of an upstanding boss, a number
10 of discrete upstanding bosses or an annular ridge. Where the closure crown is made from a thin, deformable material, such as in an ROPP closure, the spacer is preferably a solid boss which extends over substantially the whole surface of the closure crown, in order to
15 reduce the risk of witness marks appearing on the crown.

The spacer preferably defines a cavity into which the upstanding rim can fold. Again this ensures that the liner presents a smooth surface to the closure crown and does not give rise to witness marks on the crown during
20 capping. The spacer may be adapted to prevent the fold, between the rim and the periphery of the sealing flange, from buckling and folding completely flat. If the fold is completely flattened the additional spring bias effect
will not be achieved.

The closure liner according to the invention
25 provides an effective seal by wrapping the periphery of the liner around the outside edge of the container mouth. The liner is simple to mould and may be provided with other features, such as engagement tabs for connection of
30 the liner to an in-bore device for example.

The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

FIGURE 1 shows a side section view of a conventional
5 ROPP closure fitted to a bottle.

FIGURE 2 shows a side section view of an ROPP closure having a liner according to the invention, fitted to a bottle.

FIGURE 3 shows a side section view of a known in-
10 bore, non-refilling device inserted in the neck of a bottle and surrounded by a ROPP closure.

FIGURE 4 shows a side section view of the same in-bore, non-refilling device shown in Figure 3, with a modified liner according to the invention.

15 FIGURE 5 shows an isometric view of the modified liner shown in Figure 4, in its as-moulded configuration.

FIGURE 6 shows a side section view of the modified liner shown in Figure 5.

FIGURES 7A to 7D show the liner of figures 4 to 6 in
20 its as-moulded configuration, first and second partially compressed configurations and with the closure fitted to the container respectively.

Where possible in the drawings, like components have been given the same reference numerals.

25 Referring to the prior art shown figure 1, a bottle 1 is fitted with a capsule or shell 2 of the well-known ROPP variety. The capsule is stamped from aluminium and has a generally planar crown 2A and a tubular skirt 2B. Near its free end, the skirt 2B has a circumferential
30 line of weakening 3 comprising a number of slits. This

line of weakening defines a tamper evident band 4, which is retained on the bottle when the remainder of the capsule is removed. A small annular retaining bead 5 is formed around the skirt 2B at a small distance from the crown 2A. In conventional ROPP closures of this type, a cardboard wad 6 is provided to seal the neck of the bottle 1. The wad 6 is retained adjacent to the crown 2A by the retaining bead 5.

The neck of the bottle 1 has a generally cylindrical exterior surface with a stop bead 7 defined thereon. The stop bead 7 engages with the retaining bead 5, to define the axial position of the capsule on the bottle. The finish portion of the bottle 1 also has screw threads 8, a recess 9 arranged to align with the line of weakening 3 on the capsule, and a shoulder 10.

The capsule 2, with the retaining bead 5 already formed and the wad 6 inserted, is placed over the neck of the bottle 1. A tool is then rolled around the tubular skirt 2B of the capsule in the region of the screw threads 8 on the bottle, to form complimentary screw threads 11 in the capsule 2. The free end of the tubular skirt 2B is curled inwardly below the shoulder 10, to retain the tamper evident band 4 on the bottle 1 and to remove the sharp edge. When the capsule is opened, the unscrewing action fractures the line of weakening 3, severing the tamper evident band 4 from the rest of the capsule. The tamper evident band 4 is retained on the neck of the bottle by the shoulder 10, when the rest of the capsule 2 is removed.

Figure 2 shows the same ROPP closure as figure 1 with a liner 6 modified according to the invention. The liner 6 comprises a flange portion (not labelled) which extends over the rim of the opening in the bottle 1. The flange portion has an upstanding rim 40 around its periphery, which is folded as the ROPP closure is applied to the container. A raised central boss or annular rim 42 acts as a spacer to ensure that the fold between the rim 40 and the flange portion of the liner 6 does not collapse completely flat. The central boss 42 also defines an annular recess into which the rim 41 can fold. This presents a substantially smooth surface to the underside of the capsule crown 2A, ensuring that witness marks do not appear on the surface of the crown 2A during capping.

The folded rim 40 applies a biasing force to the periphery 41 of the liner 6, pushing the periphery 41 around the outside edge of the rim 12 of the container opening. By curling the periphery 41 of the liner around the outside edge of the rim 12, the sealing performance of the liner is improved. The spring bias of the fold increases the biasing force on the periphery 42 of the sealing flange, compared to a liner which relies purely on compression of the liner material to provide the necessary sealing force. This is particularly important where the liner material has to be relatively hard, due to other design considerations such as the requirement to provide snap beads to allow the liner to be releasably connected to an in-bore device.

Referring to the prior art shown in figure 3, a glass bottle 1 is fitted with a known in-bore, non-refilling device 20. These devices are often used in bottles of fine spirits, such as Scotch Whisky. The non-refilling device 20 is held captive inside the neck of the bottle by a number of flexible outwardly projecting fins 21. The device 20 generally comprises a housing which has upper and lower parts 22, 23 respectively, joined together by frangible bridges 24 of smaller cross sectional dimension than the remainder of the housing. A valve member 25 is held captive within the housing 22, 23 and is adapted to engage with a valve seat in the housing, to prevent refilling of the bottle. The frangible bridges 24 are designed to rupture, should someone try to tamper with the action of the valve member 25 and thereby refill the bottle.

The non-refilling device 20 also comprises a liner 30. The liner 30 is generally in the shape of a corrugated disc, having an elevated outer flange 31 with a downturned free edge 32. Adjacent to and inside the outer flange 31, the liner has an upwardly open peripheral groove 33. The groove 33 and flange 31 define a recess 34 in which the rim of the bottle 1 may be received and sealed. In order to enhance the seal between the liner and the rim of the bottle, the underside of the flange 31 may be formed with a number of concentric, compliant and downwardly projecting sealing beads 35. Thus, the seal is formed on the top surface of the rim of the bottle opening.

The liner 30 also comprises a number of depending catch members 37, which are arranged to co-operate with a complimentary portion 36 on the upper part of housing 22. The catch members 37 and upper part of the housing 22
5 allow the liner 30 and the main body 22, 23 of the non-refilling device 20 to be releasably connected together.

The, non-refilling device 20 is assembled by connecting the liner 30 to the main body 22, 23. The assembled non-refilling device 20 is then pushed into the
10 ROPP capsule 2 with the liner 30 leading. The downturned edge 32 of the liner 30 snap engages behind the retaining bead 5, which has been pre-formed in the capsule. The assembly of the device 20 and capsule 2 as it appears at this stage, is shown on the right hand side of figure 2.
15 The closure is now ready for use in a bottling plant.

In the bottling plant, the capsule 2 is pushed over the neck of a product filled bottle 1 and the non-refilling device 20 becomes lodged in the neck of the bottle 1 by means of the fins 21 (as shown on the left
20 hand side of figure 2). As previously described, screw threads (not shown) are then rolled into the capsule in conformity with the screw threads 8 provided on the bottle finish portion and the free edge of the capsule 2 is rolled under the shoulder 10 to secure the tamper
25 evident band 4 to the bottle.

To open the bottle, the user unscrews the capsule 2, leaving the tamper evident band 4 on the bottle. The liner 30 is held captive in the capsule 2 by the retaining bead 5 and is therefore separated from the body
30 22, 23 of the non-refilling device. When the capsule 2 is

screwed back onto the bottle, the liner 30 re-engages with the upper part of the body 22 via the catch members 37.

Figure 4 shows generally the same in-bore, non-refilling device 20 as shown in Figure 3 but with a modified liner 30 according to the invention. The liner 30 has a number of depending catch members 37, arranged to co-operate with a complimentary portion 36 on the upper part of the non-refilling device housing 22.

The liner 30 is generally in the shape of a corrugated disc and comprises a flange portion 31 which extends over the rim of the bottle opening. The flange portion 31 has an upstanding rim 40 around its periphery, which is folded when the ROPP closure is applied to the container. A raised central boss or annular rim acts as a spacer 42 between the crown 2A of the capsule and the sealing flange 31. Spacer 42 is sized to ensure that the fold between the rim 40 and the flange portion 31 does not collapse completely flat. The central boss 42 defines an annular recess into which the rim 41 can fold. This presents a substantially smooth surface to the underside of the capsule crown 2A, ensuring that witness marks do not appear on the surface of the crown 2A during capping.

During capping, the rim 40 is folded towards the sealing flange 31 by the force applied to the crown 2A of the capsule. The folded rim 40 applies a biasing force to the periphery 41 of the liner, pushing it around the outside edge 12 of the rim of the container opening, to provide an improved seal.

The remaining features of the non-refilling device are the same as those shown in figure 3. The capping procedure is also as generally described in relation to Figure 3.

5 Referring to figures 5 and 6, a liner according to one embodiment of the invention, which is suitable for use in conjunction with an in-bore device, comprises a sealing flange 31 which is sized so that it extends over the rim of a container opening. An upstanding rim 40
10 extends around the periphery of the sealing flange 31. When a closure containing the liner is applied to a container, the force applied to the crown of the closure causes the upstanding rim 40 to fold towards the sealing flange 31 as previously described in relation to figures
15 2 and 4.

In its as-moulded configuration (shown in Figures 5 and 6), the sealing flange 31 slopes downwardly towards the periphery of the liner, whilst the upstanding rim 40 is substantially vertical. This configuration ensures
20 that the rim 40 folds during capping and that the periphery of the liner seals around the outside edge of the rim of the container opening (as discussed in relation to figures 7A to 7D below). This arrangement also allows the liner to be retained in a closure by a
25 conventional wad bead.

The liner may also comprise a number of depending catch members 37, arranged to co-operate with complimentary portions on the upper part of an in-bore device. A spacer 42 is provided inside the rim 40,
30 suitably spaced to provide a recess 43 into which the rim

40 can fold. The spacer 42 is also arranged to provide the liner with a substantially flat upper surface to prevent witness marks appearing on the visible surface of the closure crown.

5 Figures 7A to 7D show the configuration of the liner in an ROPP capsule at four stages during the capping process. Figure 7A shows the liner in its as-moulded configuration, figures 7B and 7C show the liner at two intermediate stages and figure 7D shows the liner
10 configuration when the ROPP capsule is fully fitted on the container.

Referring to figure 7A, the liner comprises a sealing flange 31, which extends over the rim of a container opening. An upstanding rim 40 extends around
15 the periphery of the sealing flange 31. In the liner's as-moulded configuration, the sealing flange 31 slopes downwardly towards the periphery of the liner and the upstanding rim 40 extends substantially vertical to the main plane of the liner. The liner is connected to the
20 remainder of an in-bore device by catch members 37. The assembled in-bore device (only liner shown) is then inserted into an ROPP capsule 2 and the liner snaps behind the annular retaining bead 5, thereby retaining the device within the capsule. The in-bore device is then
25 placed into the neck of a container 1 and the capsule fits around the outside of the container neck. Force is applied to the closure crown 2A to force the in-bore device into the bore of the container opening.

As shown in figure 7B, the force applied to the
30 closure crown 2A forces the lower surface of the sealing

flange 31 into contact with the rim of the container opening. This forces the sealing flange 31 into a substantially horizontal configuration and thereby cams the upstanding rim 40 slightly inward from its initial vertical position.

Referring to figure 7C, further force on the closure crown 2A acts on the upstanding rim 40 to push the periphery of the sealing flange 41 around the outside edge 12 of the rim of the container opening and also forces the upstanding rim 40 to fold towards the upper surface of the liner, into the recess left by the spacer 42.

Finally, as shown in figure 7D, the force on the closure crown 2A pushes the crown 2A into contact with the spacer 42. Screw threads conforming to the threads on the container 1 are then rolled into the capsule 2 as previously described. In this fully capped configuration, the closure crown 2A is in contact with the Spacer 42 and the rim 40 is folded towards the upper surface of the liner. The fold between the sealing flange 31 and rim 40 acts in the same way as a folded spring and maintains a sealing force on the periphery of the liner 41. The free end of the rim 40 may be forced into contact with the upper surface of the liner but complete collapse of the fold is avoided. The spacer 42 may be sized and arranged to ensure that complete collapse of the fold does not occur. This ensures that the folded rim 40 acts as a spring, biasing the periphery 41 of the liner around the outer rim of the container opening 12 even when the liner material is relatively rigid.

CLAIMS

1. A closure comprising a closure shell (2A) and a liner (6) adapted to seal the mouth of a container, the liner (6) having a sealing flange (31), arranged to overlie the container mouth, the sealing flange (31) having an upstanding rim (40) around its periphery, characterised in that on application of the closure on the container the upstanding rim (40) folds towards the sealing flange (31), without folding completely flat, thereby constituting a biasing means for biasing the periphery of the sealing flange against the outside edge (12) of the container mouth.
2. A closure according to claim 1, wherein the upstanding rim (40) is adapted to prevent itself folding completely flat.
3. A closure according to claim 1 or claim 2, wherein the sealing flange further comprises a spacer (42), arranged between the opposed surfaces of the sealing flange (31) and the closure, the spacer (42) arranged to prevent the upstanding rim (40) from folding completely flat.
4. A closure according to claim 3, wherein the spacer (42) is adapted to provide a recess into which the upstanding rim can fold.

5. A closure according to any one of the preceding claims, wherein the upstanding rim (40) is arranged substantially parallel to the central axis of the closure and the sealing flange (31) is arranged at an acute angle to the upstanding rim (40), so that the sealing flange (31) cams the upstanding rim (40) inwardly as it contacts the neck (1) of the container.

6. An in-bore device for a container, having a body portion (20) at least part of which is adapted to be held firmly in the neck (1) of a container, and a liner portion (30), arranged to be held captive in a closure (2A) and to co-operate releasably with the body portion (20),

the liner portion (30) having a sealing flange (31), arranged to overlie the container mouth, the sealing flange (31) having an upstanding rim (40) around its periphery, characterised in that on application of the closure (2A) and in-bore device (20) to the container the upstanding rim (40) folds towards the sealing flange (31), without folding completely flat, thereby constituting a biasing means for biasing the periphery of the sealing flange (31) against the outside edge (12) of the container mouth.

1/4

Fig.1. PRIOR ART.

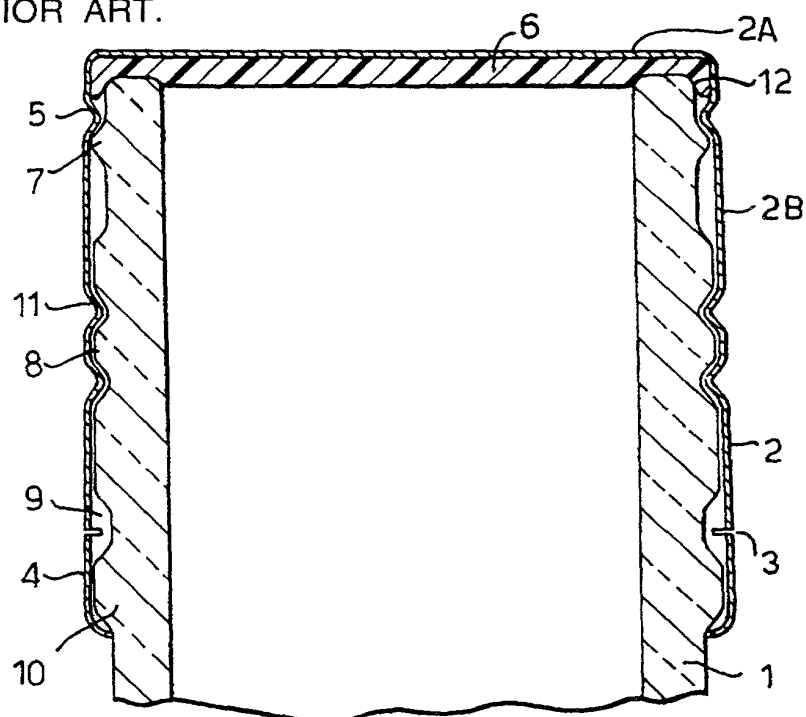


Fig.2.

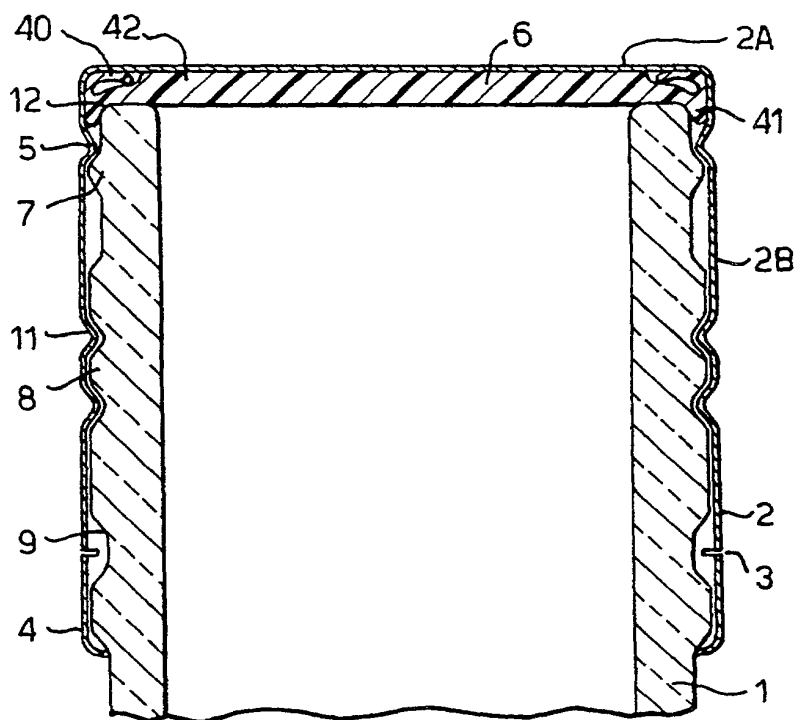


Fig.3. PRIOR ART.

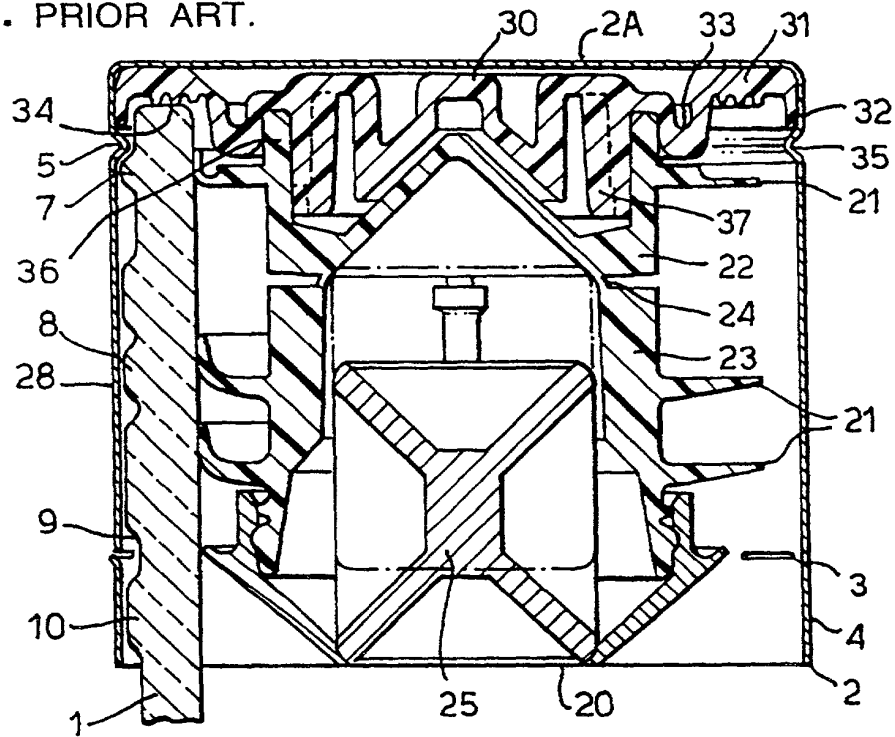


Fig.4.

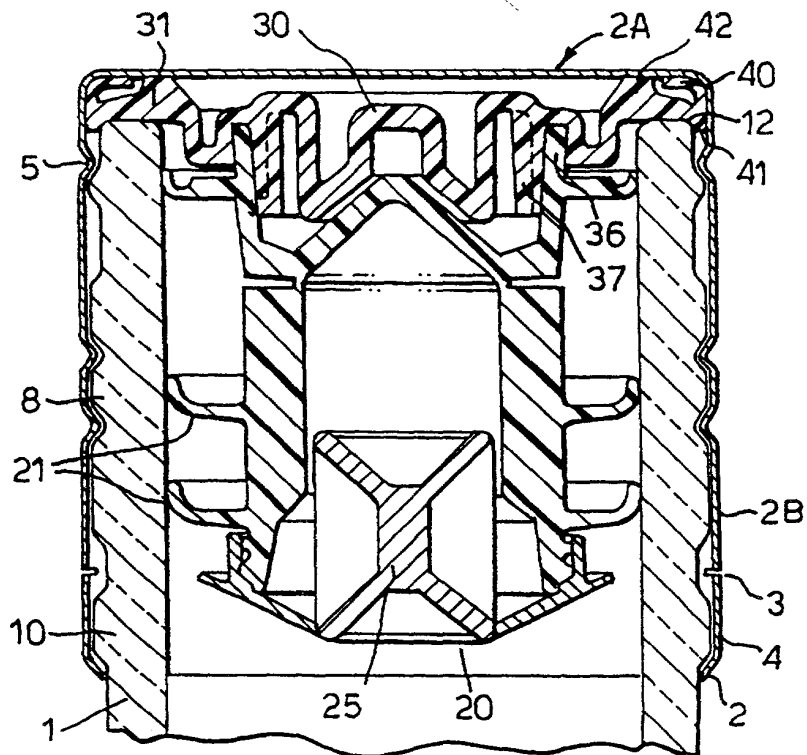


Fig.5.

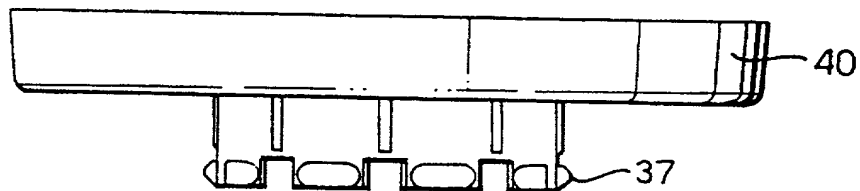


Fig.6.

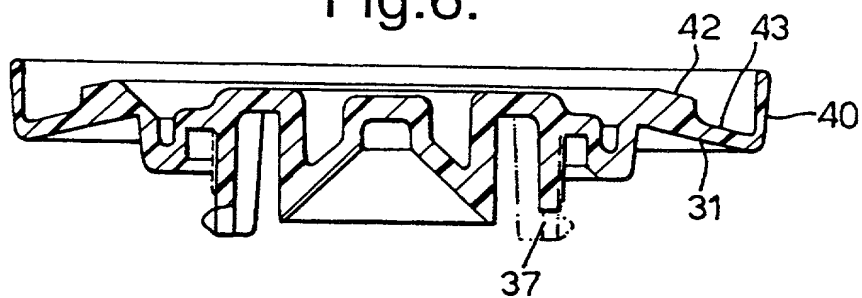


Fig.7A.

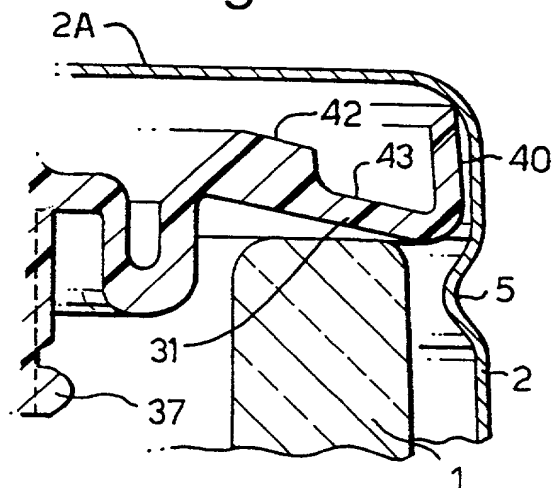


Fig.7B.

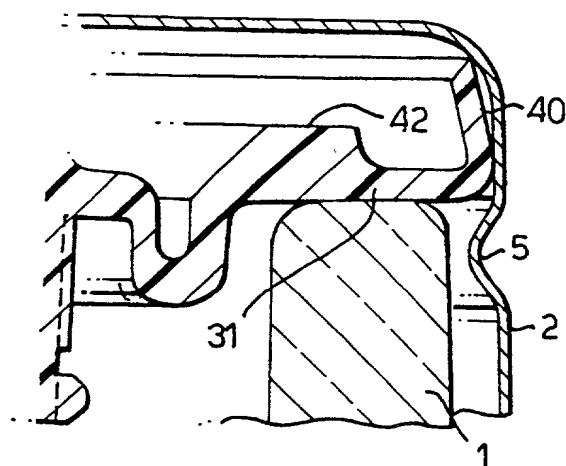


Fig.7C.

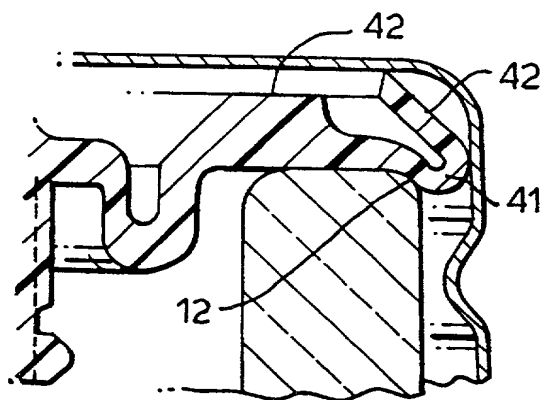
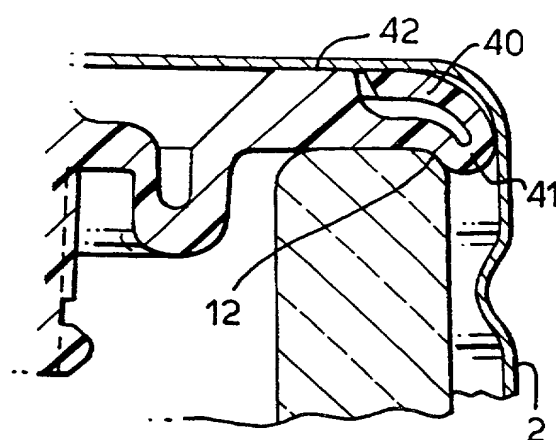


Fig.7D.



W010AUSw

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

(Includes Reference to PCT International Applications)

ATTORNEY'S DOCKET NUMBER

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

"CLOSURE SEALING WAD"

the specification of which (check only one item below):

- ☐ is attached hereto.
- ☐ was filed as United States application

Serial No. _____
on _____,
and was amended
on _____ (if applicable).

- ☒ was filed as PCT international application

Number PCT/GB00/00621
on 22 February 2000,
and was amended under PCT Article 19
on - (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:

COUNTRY (if PCT, indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 119
GB	9904760.7	3 March 1999	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:

U.S. APPLICATIONS		STATUS (Check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED

PCT APPLICATIONS DESIGNATING THE U.S.					
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)	PATENTED	PENDING	ABANDONED

① **POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration number)

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

SIGNATURE OF INVENTOR 201	SIGNATURE OF INVENTOR 202	SIGNATURE OF INVENTOR 203
DATE	DATE	DATE
<u>31st July 2001</u>	<u>31 July 2001</u>	<u>31 July 2001</u>